

Objective: Minimize Impact of Aging Plant.

Measures: Availability

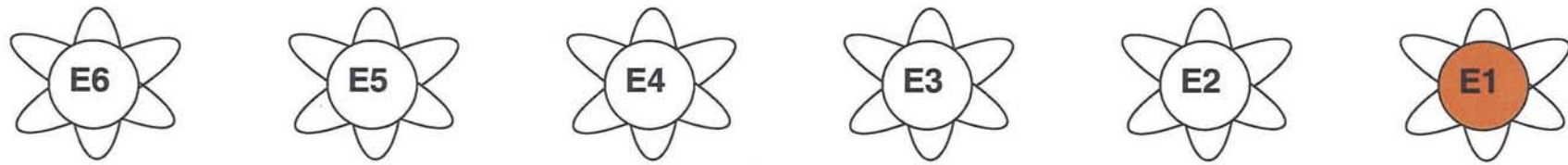
Initiatives: Install new burners and elbows during Unit 2 Outage.

Advanced Burner Technologies, A Siemens Company, was contracted to provide redesigned burner injectors and flat back elbows under an agreement with Siemens. The injector is the internals of the burner which includes the coal barrel, the burner tip and the inner air assembly. The new design included lining the barrel with alumina pipe brick and replacing the transition piece between the barrel and the tip from carbon steel to 253 MA stainless steel. The flowered tip was changed to minimize the impact angle and the interior ridges were sprayed with tungsten carbide for higher erosion resistance. A flat back elbow with ABT's fuel distributor replaced the sweep elbow.

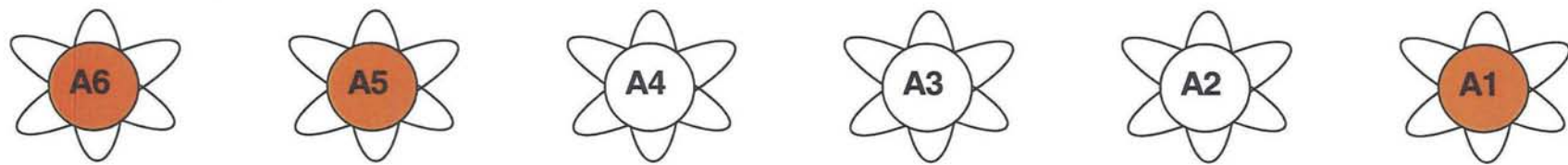
All 48 new injectors and elbows arrived in time to be replaced during the Spring 2008 Planned Outage. AP&F was contracted to remove the old elbows and injectors and install the new injectors and elbows. They also repaired known damage as well as damage found during inspections. This included repair work on 16 air flow dividers and two throat sections which had been damaged enough to warrant repair. All repairs were completed within the outage window.

After initial coal feeder issues, the performance of the burners have been good. NOx levels have been able to be met without over-fire air with most coals to-date. Air adjustments to maintain burner and tip temperatures under alarm limits are continuing as different pulverizers are taken out of service.

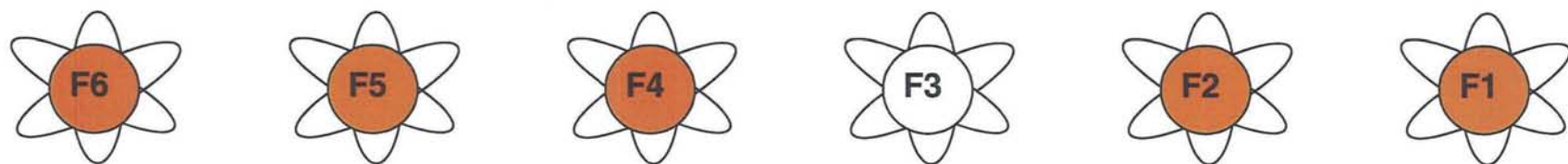
Air flow dividers designated to replace. Additional ones may be added after injectors pulled.  
8th Floor



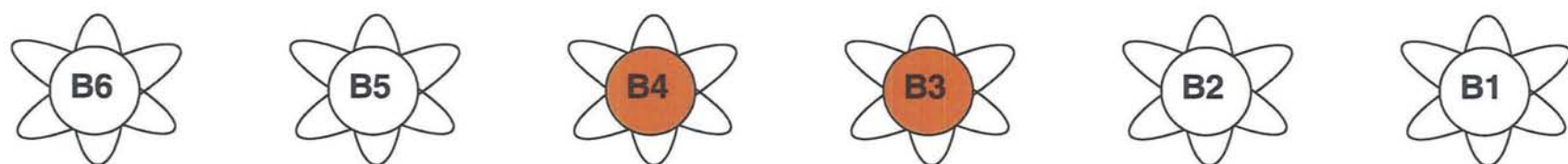
7th Floor



6th Floor



5th Floor

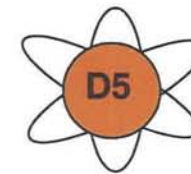
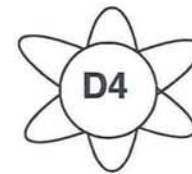
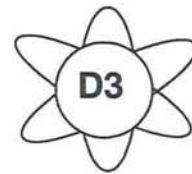
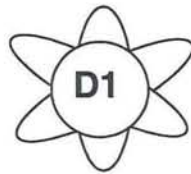


West

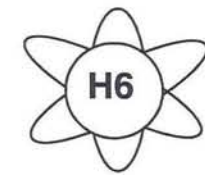
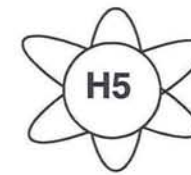
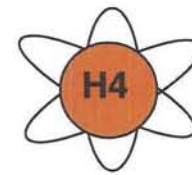
Front wall looking North

East

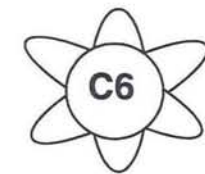
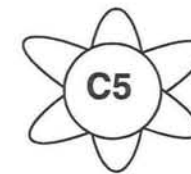
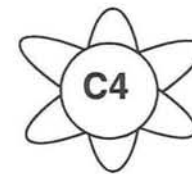
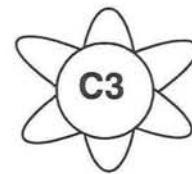
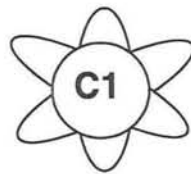
8th Floor



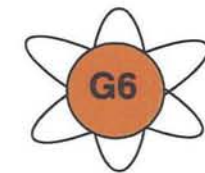
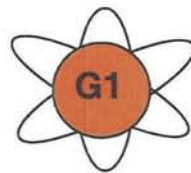
7th Floor



6th Floor



5th Floor

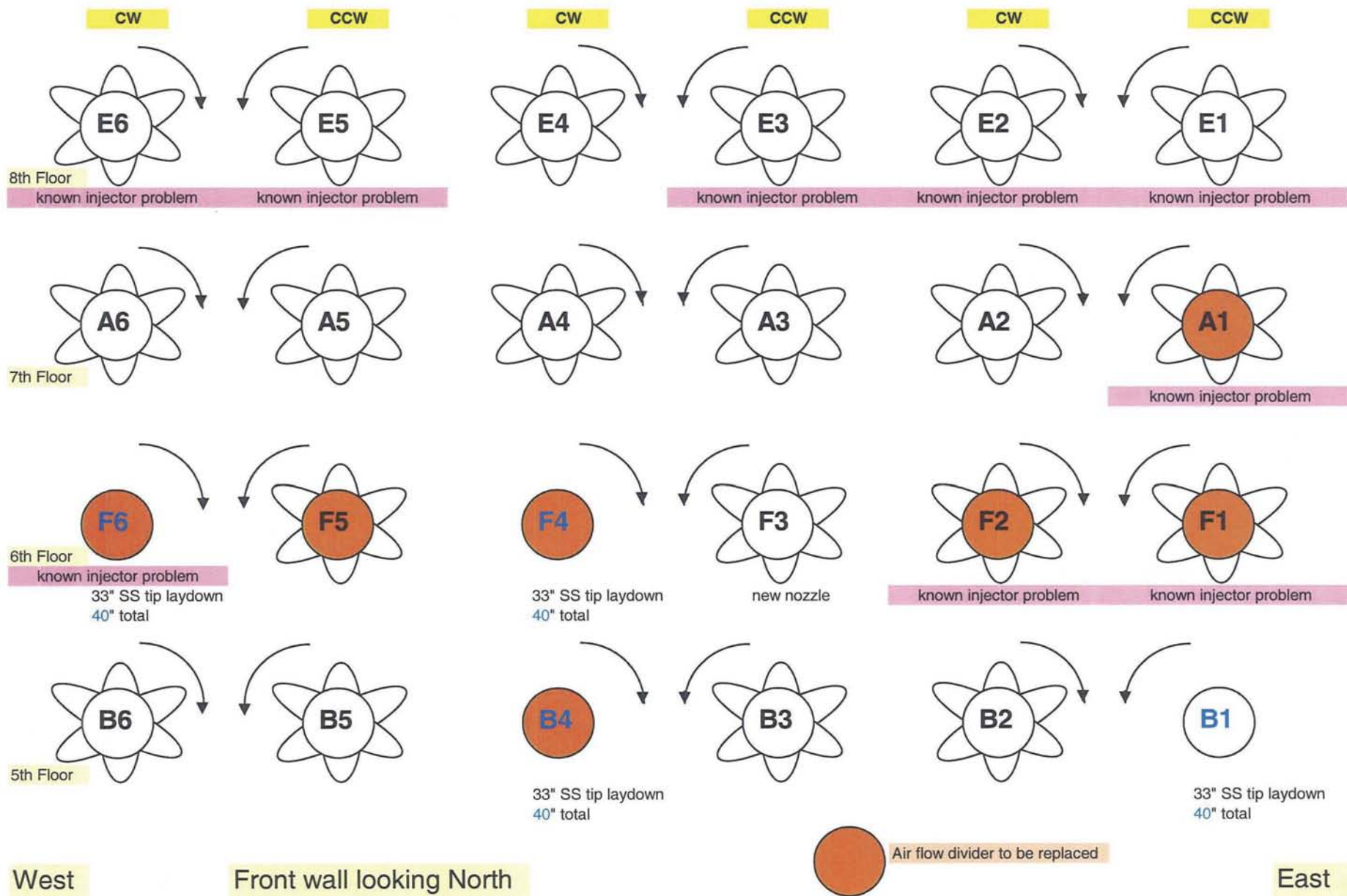


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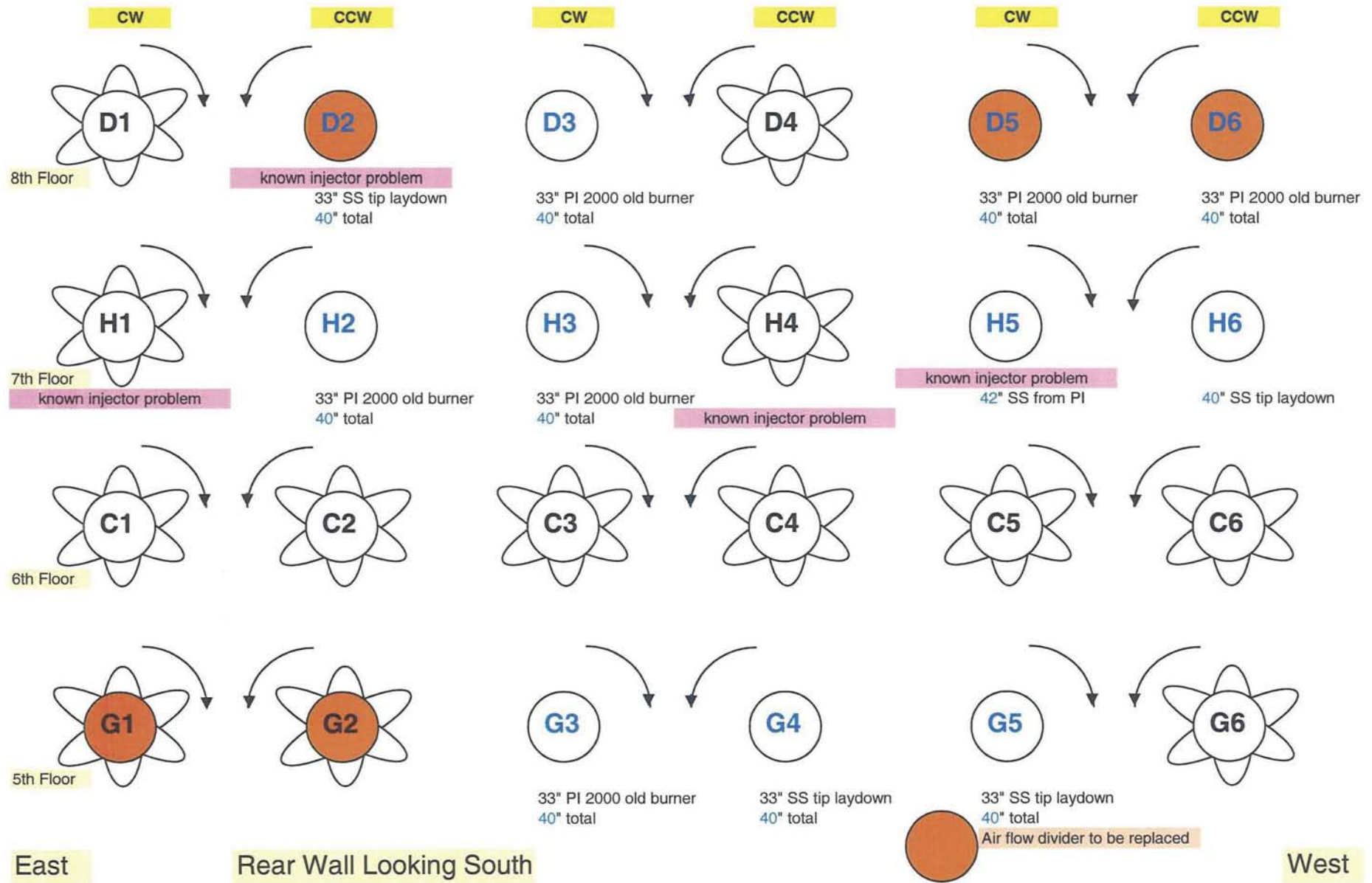
Rear Wall Looking South

West

IP7021284

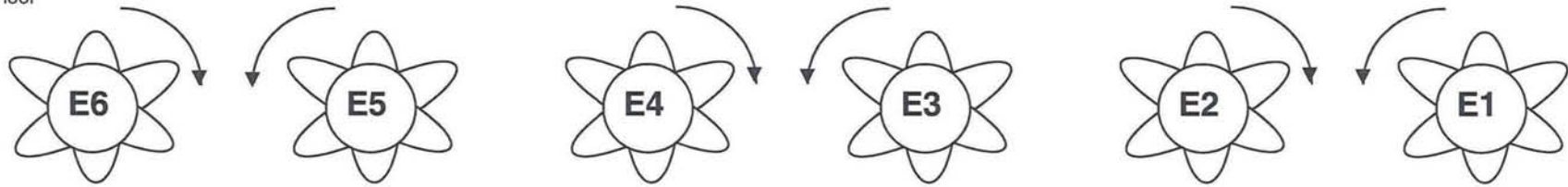




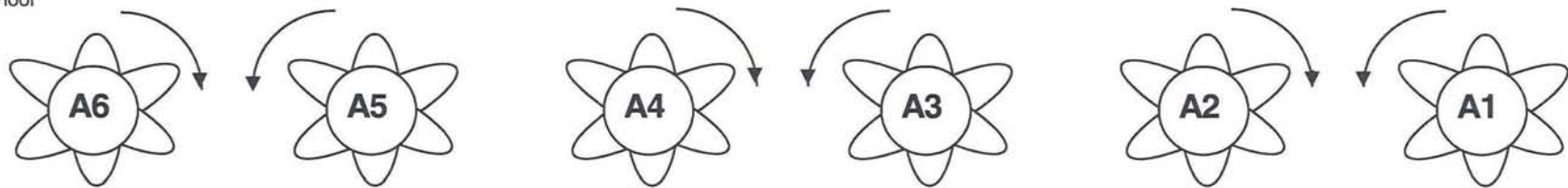


Tips removed and replaced designated in yellow, all others were repaired with segment wear liners on all 6 pedals.

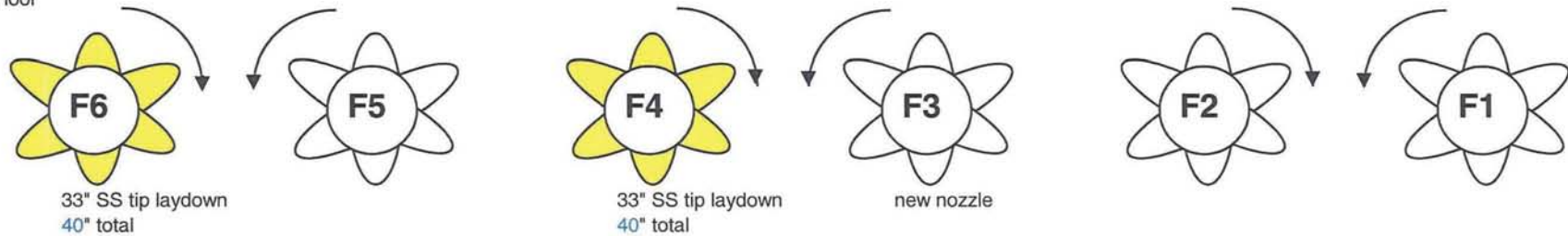
8th Floor



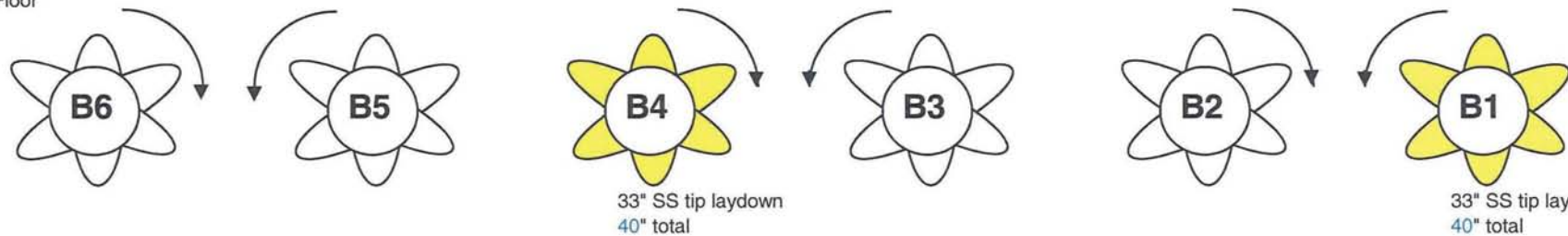
7th Floor



6th Floor



5th Floor

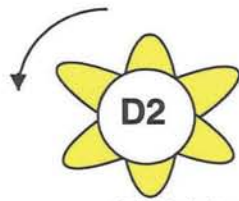
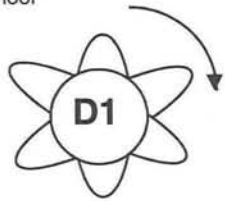


West

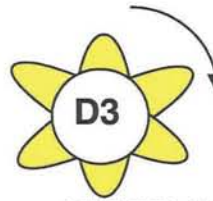
Front wall looking North (Tips to have air sleeve moved back.) **Tip to be replaced**

East

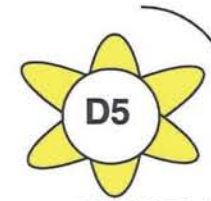
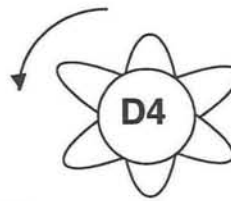
8th Floor



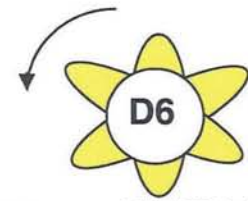
33" SS tip laydown  
40" total



33" PI 2000 old burner  
40" total

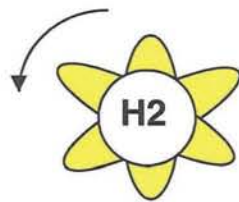
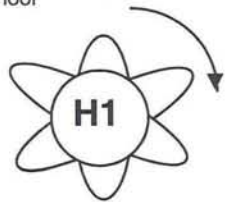


33" PI 2000 old burner  
40" total

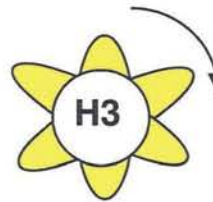


33" PI 2000 old burner  
40" total

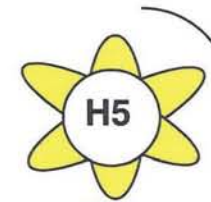
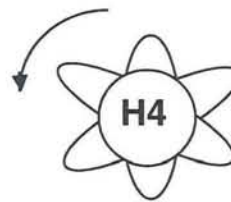
7th Floor



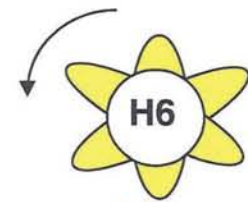
33" PI 2000 old burner  
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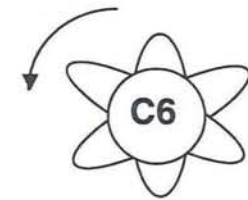
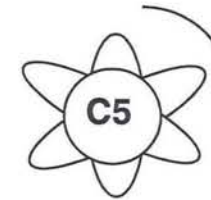
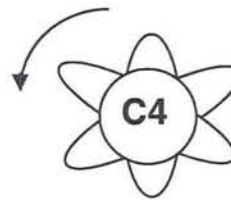
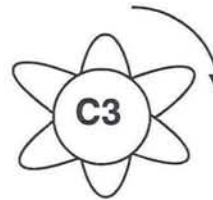
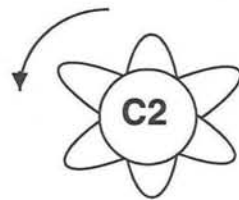
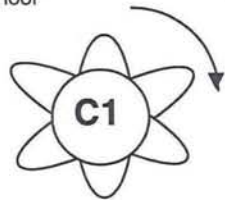


42" SS from PI

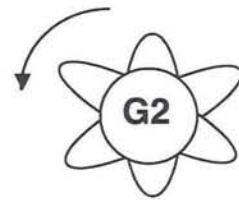
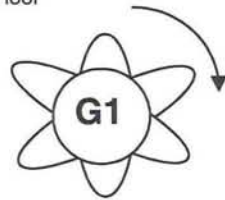


40" SS tip laydown

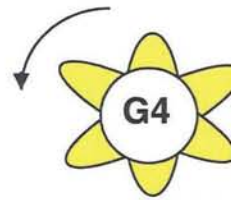
6th Floor



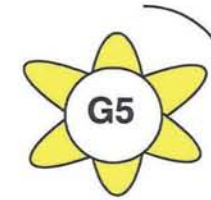
5th Floor



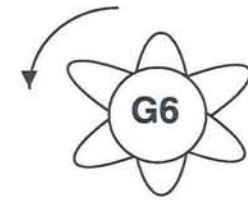
33" PI 2000 old burner  
40" total



33" SS tip laydown  
40" total



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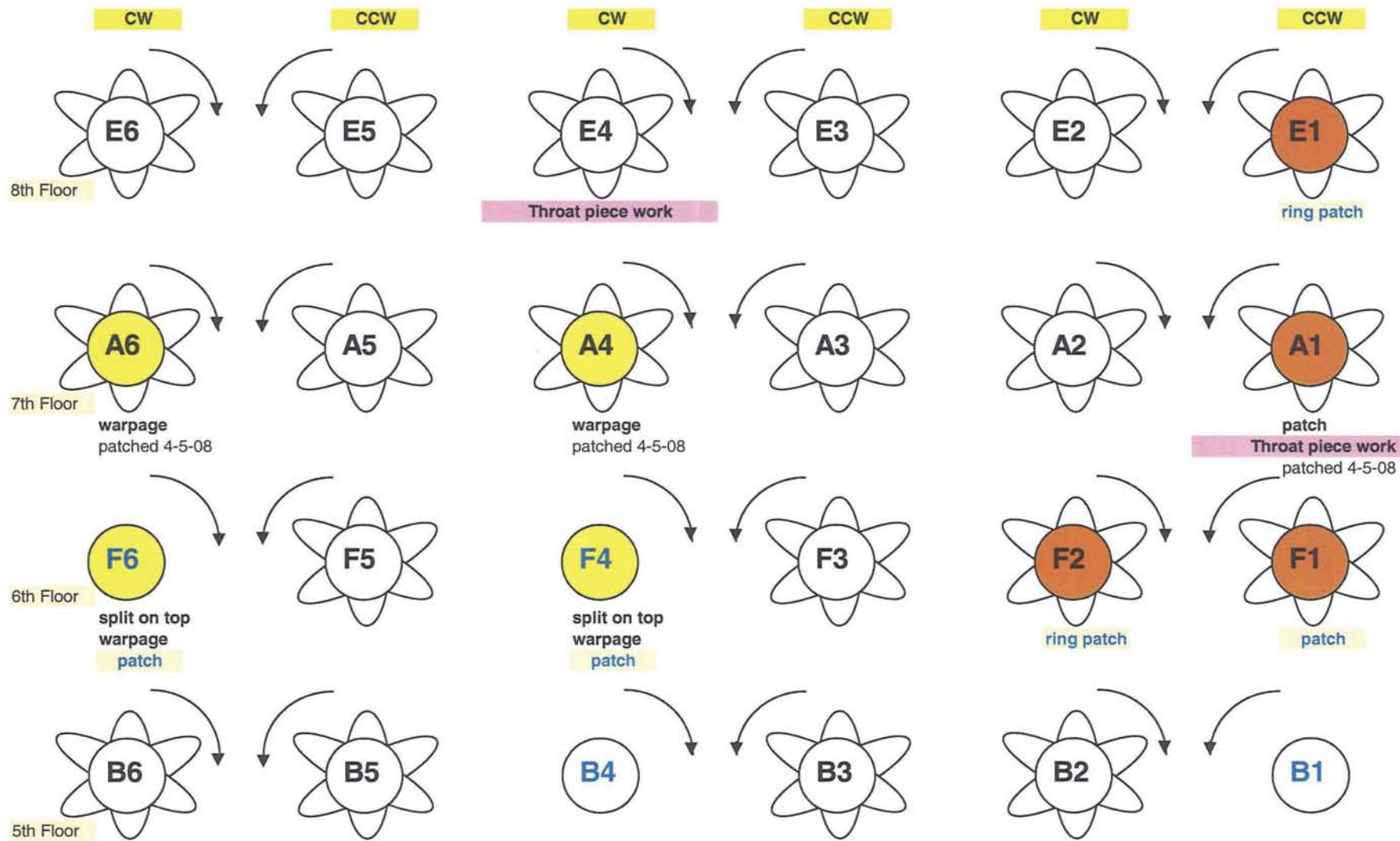


East

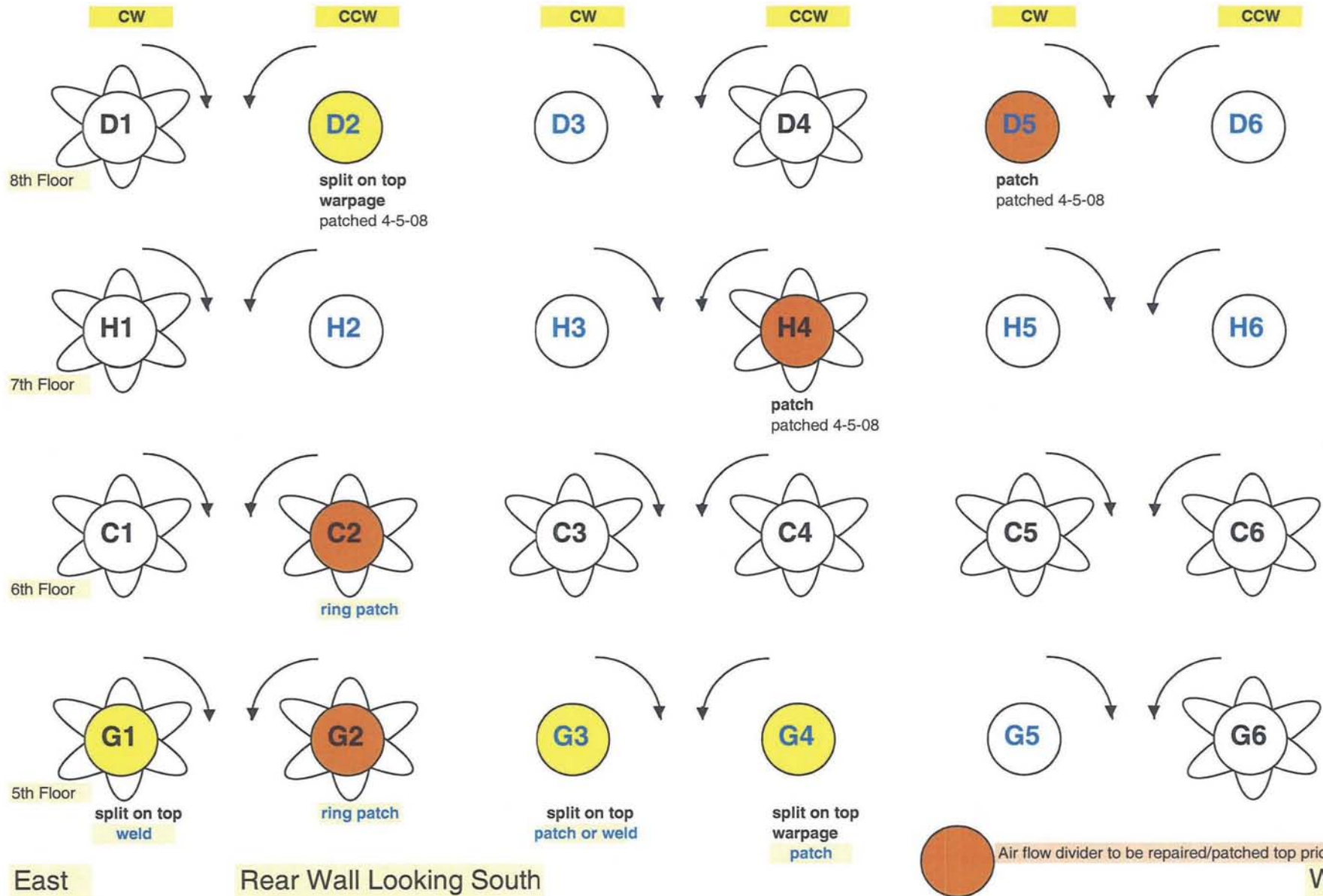
Rear Wall Looking South (Tips to have air sleeve moved back) **Tip to be replaced**

West









## Inner air sleeve settings ABT Burner

Inner air sleeve has 12 holes in the handle. With the bolt through the 12th hole (showing 11 holes) the sleeve is closed. With sleeve pushed in with the bolt in the 1st hole, opening 6 1/4 " opening. Below is a list with measured opening per bolt in each hole.

| bolt in XX hole | opening " |  |
|-----------------|-----------|--|
| 12th            | 0         | closed   |
| 11th            | 1/2       |  |
| 10th            | 1 1/4     |  |
| 9th             | 1 3/4     |  |
| 8th             | 2 3/8     |  |
| 7th             | 2 7/8     | present '06 setting 7th in from handle, 7th from full open |
| 6th             | 3 3/8     |  |
| 5th             | 3 7/8     |  |
| 4th             | 4 7/16    |  |
| 3rd             | 5 1/16    |  |
| 2nd             | 5 3/4     |  |
| 1st             | 6 1/4     | full open, all the way pushed in                           |

| reading on second injector |         |           | calc'd  |                    |
|----------------------------|---------|-----------|---------|--------------------|
|                            | opening |           |         |                    |
| 1st                        | 6 1/8   | full open | 6 3/16  |                    |
| 2nd                        | 5 1/2   |           | 5 10/16 |                    |
| 3rd                        | 4 7/8   |           | 5 1/16  |                    |
| 4th                        | 4 1/4   |           | 4 8/16  |                    |
| 5th                        | 3 3/4   |           | 3 15/16 | as left            |
| 6th                        | 2 15/16 |           | 3 6/16  |                    |
| 7th                        | 2 1/2   |           | 2 13/16 | as found           |
| 8th                        | 2       |           | 2 4/16  |                    |
| 9th                        | 1 11/16 |           | 1 11/16 |                    |
| 10th                       | 1 1/16  |           | 1 2/16  | setting '04 to '06 |
| 11th                       | 11/16   |           | 9/16    |                    |
| 12th                       | 0       | closed    | 0       |                    |

3rd to 7th hole with  
new nozzles installed '08  
setting after '06 outage

- 1- save bolts and nuts on elbow and injector
- 2- pull all elbows and injectors
- 3- make sure proper orientation injector in proper spot CW vs CCW  
all burners are marked, also shown on work sheet
- 4- Air flow divider - put bevel end furnace side and install with seam at 6 o'clock position (bottom)  
Worst 12 have been marked on drawing. Inspection will determine the next twelve to be repaired if needed.
- 5- Injectors will still be coming in after start of outage. Leave C row (6th level on back wall last) incase they do not arrive in time. Put new elbows only on new injector. Therefore do not remove old elbows and injectors from burner level until replaced by new parts. Worst case we will have to repair some old injectors and move to needed levels.

D1 and D3 have the reversed TC locations

# Work Order Request # 113939

| Unit 2 Present |            |              | New burner thermocouple settings |                |            |                | New           |            |                |
|----------------|------------|--------------|----------------------------------|----------------|------------|----------------|---------------|------------|----------------|
| Burner         | elbow temp | intermediate | burner tip                       | pt to initiate | in-service | out-of-service | burner barrel | in-service | out-of-service |
| B1             | 2sgate1536 | 2sgate1537   | 2sgate1536                       | 2SGAES0006     | 800        | 1400           | 2sgate1537    | 650        | 1200           |
| B2             | 2sgate1402 | 2sgate1403   | 2sgate1402                       |                | 800        | 1400           | 2sgate1403    | 650        | 1200           |
| B3             | " "1538    | " "1539      | " "1538                          |                | 800        | 1400           | " "1539       | 650        | 1200           |
| B4             | " "1408    | " "1410      | " "1408                          |                | 800        | 1400           | " "1410       | 650        | 1200           |
| B5             | " "1540    | " "1541      | " "1540                          |                | 800        | 1400           | " "1541       | 650        | 1200           |
| B6             | " "1412    | " "1414      | " "1412                          |                | 800        | 1400           | " "1414       | 650        | 1200           |
| F1             | " "1416    | " "1418      | " "1416                          | 2SGAES0010     | 800        | 1400           | " "1418       | 650        | 1200           |
| F2             | " "1542    | " "1543      | " "1542                          |                | 800        | 1400           | " "1543       | 650        | 1200           |
| F3             | " "1420    | " "1422      | " "1420                          |                | 800        | 1400           | " "1422       | 650        | 1200           |
| F4             | " "1544    | " "1545      | " "1544                          |                | 800        | 1400           | " "1545       | 650        | 1200           |
| F5             | " "1428    | " "1430      | " "1428                          |                | 800        | 1400           | " "1430       | 650        | 1200           |
| F6             | " "1546    | " "1547      | " "1546                          |                | 800        | 1400           | " "1547       | 650        | 1200           |
| A1             | " "1548    | " "1549      | " "1548                          | 2SGAES0005     | 800        | 1400           | " "1549       | 650        | 1200           |
| A2             | " "1432    | " "1434      | " "1432                          |                | 800        | 1400           | " "1434       | 650        | 1200           |
| A3             | " "1550    | " "1551      | " "1550                          |                | 800        | 1400           | " "1551       | 650        | 1200           |
| A4             | " "1436    | " "1438      | " "1436                          |                | 800        | 1400           | " "1438       | 650        | 1200           |
| A5             | " "1552    | " "1553      | " "1552                          |                | 800        | 1400           | " "1553       | 650        | 1200           |
| A6             | " "1444    | " "1446      | " "1444                          |                | 800        | 1400           | " "1446       | 650        | 1200           |
| E1             | " "1448    | " "1450      | " "1448                          | 2SGAES0009     | 800        | 1400           | " "1450       | 650        | 1200           |
| E2             | " "1554    | " "1555      | " "1554                          |                | 800        | 1400           | " "1555       | 650        | 1200           |
| E3             | " "1456    | " "1458      | " "1456                          |                | 800        | 1400           | " "1458       | 650        | 1200           |
| E4             | " "1556    | " "1557      | " "1556                          |                | 800        | 1400           | " "1557       | 650        | 1200           |
| E5             | " "1460    | " "1462      | " "1460                          |                | 800        | 1400           | " "1462       | 650        | 1200           |
| E6             | " "1558    | " "1559      | " "1558                          |                | 800        | 1400           | " "1559       | 650        | 1200           |
| G1             | " "1479    | " "1478      | " "1479                          | 2SGAES0011     | 800        | 1400           | " "1478       | 650        | 1200           |
| G2             | " "1564    | " "1565      | " "1564                          |                | 800        | 1400           | " "1565       | 650        | 1200           |
| G3             | " "1475    | " "1474      | " "1475                          |                | 800        | 1400           | " "1474       | 650        | 1200           |
| G4             | " "1562    | " "1563      | " "1562                          |                | 800        | 1400           | " "1563       | 650        | 1200           |
| G5             | " "1467    | " "1466      | " "1467                          |                | 800        | 1400           | " "1466       | 650        | 1200           |
| G6             | " "1560    | " "1561      | " "1560                          |                | 800        | 1400           | " "1561       | 650        | 1200           |
| C1             | " "1570    | " "1571      | " "1570                          | 2SGAES0007     | 800        | 1400           | " "1571       | 650        | 1200           |
| C2             | " "1495    | " "1494      | " "1495                          |                | 800        | 1400           | " "1494       | 650        | 1200           |
| C3             | " "1568    | " "1569      | " "1568                          |                | 800        | 1400           | " "1569       | 650        | 1200           |
| C4             | " "1487    | " "1486      | " "1487                          |                | 800        | 1400           | " "1486       | 650        | 1200           |
| C5             | " "1566    | " "1567      | " "1566                          |                | 800        | 1400           | " "1567       | 650        | 1200           |
| C6             | " "1483    | " "1482      | " "1483                          |                | 800        | 1400           | " "1482       | 650        | 1200           |
| H1             | " "1511    | " "1510      | " "1511                          | 2SGAES0012     | 800        | 1400           | " "1510       | 650        | 1200           |
| H2             | " "1576    | " "1577      | " "1576                          |                | 800        | 1400           | " "1577       | 650        | 1200           |
| H3             | " "1507    | " "1506      | " "1507                          |                | 800        | 1400           | " "1506       | 650        | 1200           |
| H4             | " "1574    | " "1575      | " "1574                          |                | 800        | 1400           | " "1575       | 650        | 1200           |
| H5             | " "1499    | " "1498      | " "1499                          |                | 800        | 1400           | " "1498       | 650        | 1200           |
| H6             | " "1572    | " "1573      | " "1572                          |                | 800        | 1400           | " "1573       | 650        | 1200           |
| D1             | " "1582    | " "1583      | " "1582                          | 2SGAES0008     | 800        | 1400           | " "1583       | 650        | 1200           |
| D2             | " "1527    | " "1526      | " "1527                          |                | 800        | 1400           | " "1526       | 650        | 1200           |
| D3             | " "1580    | " "1581      | " "1580                          |                | 800        | 1400           | " "1581       | 650        | 1200           |
| D4             | " "1519    | " "1518      | " "1519                          |                | 800        | 1400           | " "1518       | 650        | 1200           |
| D5             | " "1578    | " "1579      | " "1578                          |                | 800        | 1400           | " "1579       | 650        | 1200           |
| D6             | " "1515    | " "1514      | " "1515                          |                | 800        | 1400           | " "1514       | 650        | 1200           |